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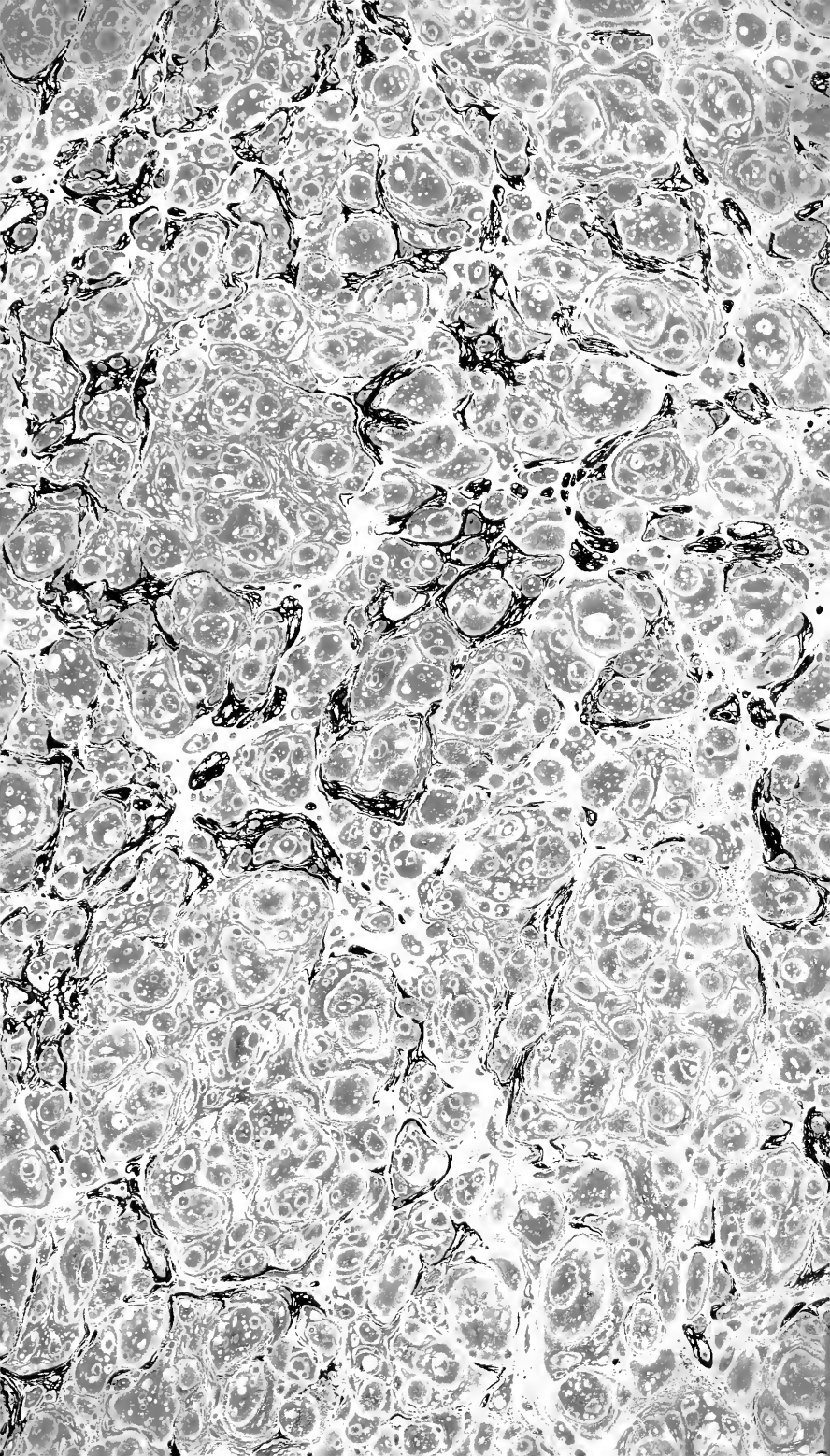
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AN

ESSAY

ON

WATER IN THE BRAIN.

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AN
ESSAY

ON THE

NATURE, CAUSES, AND TREATMENT,

OF

WATER IN THE BRAIN.



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“ Verum sive hæc ratio sit hujusce phænomeni, sive alia aliqua
magis abstrusa, judicent illi quibus animus atque otium est talia
speculari.”—SYDENHAM.

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1825.

commonly to be found among people in search of that want of discrimination to this source, already so doubtful on the one hand, and by persons and practitioners to be apparent in evidence, and extremely reliable origin and character, especially such that many other and almost very important in outcome to account for the fact. It is true that was probably a case, however we may have, or other testimony, failed to exist, the price is either a more valuable source in practice, that is, a more valuable source in practice, who has been long engaged in the (English) have conducted the operation of

PREFACE.

It cannot have escaped the observation of any physician who has been long engaged in practice, that hydrocephalus, or water in the brain, is either a more frequent occurrence, or more frequently suspected to exist, than was formerly the case, however we may attempt to account for the fact. It is true that many other affections, very different in their origin and character, especially such as appear in children, are erroneously referred both by parents and practitioners to this source, arising, no doubt, on the one hand from that want of discrimination so commonly to be found among people in

general, which leads them to confound diseases essentially different in themselves, if they only possess one or two accidental points of slight resemblance; and on the other hand from the influence of fashion on the minds of practitioners, which leads them to embrace any novel theory or hypothesis, without sufficiently investigating those facts which support or militate against it.

Examples of this kind are not unfrequent in the annals of medicine; at one time, in compliance with some fashionable dictum, all diseases are considered to be *nervous*, at another time *bilious*, and at another time *inflammatory*; now they are attributed to a vitiated state of the fluids in the system, now to "morbid action" of the solids. Thus some fashionable hypothesis prevails for a season, to be relinquished in no long time for some one still more novel and captivating.

The few observations offered in the following pages, are intended to controvert the doctrine of water in the brain being a distinct specific disease, and to oppose the prevalent opinion of the proximate cause of the watery effusion being inflammation. It has been the author's endeavour to shew that this symptom, water in the brain, is an accidental occurrence, taking place in a great variety of diseases, and as the consequence of numerous causes acting upon the cerebral organs, depending upon a certain condition of those organs, constituting a state of predisposition merely, without the presence of actual cerebral disease.

If, as there is reason to suppose is the case, remedial treatment is more frequently directed now than formerly, especially in children, with the view of combating hydrocephalus as a distinct idiopathic disease,—it

becomes an important object to ascertain whether the means thus adopted are not most inappropriate to oppose the actual disease, of which the existing symptoms constitute a part, supposing effusion to be but an accidental, and not an essential condition of such disease.

In thus denying the existence of hydrocephalus acutus as a distinct specific disease, the author, of course subverts the supposed proximate cause of that affection; indeed the opinions entertained on this subject by him, are derived rather from observation of the connexion and progress of the symptoms, and the efficacy and inefficacy of remedial treatment, than from any speculation on the proximate cause, which is, in most cases, perfectly useless, unless the term be employed as a mere synonym for the nosological designation of the disease;

as when we call inflammation of the pleura, the proximate cause of pleurisy; inflammation of the brain, that of phrenitis,* &c.

No investigation has yet been able to detect any simple and obvious state or alteration in the system, upon which all the phenomena of any one disease invariably depend; the symptoms of most diseases arise successively, and are apparently each produced by the others preceding it. The first evidence we have of an exciting cause having produced disease, is the appearance of the symptoms of disease themselves, and it is in vain to search after any intermediate state, which alone can constitute what, according to the strict definition of that term, is called the proximate cause. In every other sense, the proximate cause constitutes

* See Temple, Clarke, and others.

the disease, that is, is the first link in the chain of morbid changes produced by the action of exciting causes. It neither adds to our knowledge of the nature and history of the disease, nor conduces to any increased facility of removing it, to feign some previous hidden and obscure change, for the purpose of calling it the proximate cause.

It is to be regretted, that even in the present day we are more occupied in vainly searching into the occult and abstruse causes of diseases, than in observing their history, usual progress, and natural terminations; are more anxious to explain the occurrence and account for the production of symptoms, than to describe their successive order, and to attain a comprehensive view of the distinctive character and uniform essence of each particular disease. This is, as it has been well expressed by an able

author, “ as if a geographer were not to describe a country, but reason why a hill should be placed in one region, a valley in the other; why one shore is rocky, another sandy; instead of actually giving the situation of the hills and valleys, the rockiness or sandiness of the shores.”*

Whilst occupied in these researches, we are in danger of losing the advantages already obtained by successive centuries spent in investigating symptomological pathology, and the medicinal properties of remedies; and of sacrificing clinical observation to morbid anatomy, which, however valuable as a branch of medical science, is at best but an inconsiderable branch compared with clinical observation, viewing both of them in their relation to the grand and important end

* Fordyce on Fever, Diss. I. p. 27.

of medical science, the alleviation and removal of disease.

The author is aware that it will be considered almost heretical to express a single doubt of the superior value of anatomical pathology, compared with clinical observation, in obtaining an accurate knowledge of diseases; but thinking as he does, that the latter is infinitely superior in this respect to the former, he is not deterred from avowing that opinion, notwithstanding its present unpopularity. He is not inclined to undervalue morbid anatomy as a means of adding to our knowledge, but he cannot go the length of elevating this branch of science to the important station which it occupies at present in the medical world, to the almost total exclusion of clinical observation, and neglect of the study of the natural history of diseases. Morbid anatomy is a useful

handmaid, but she should not be injudiciously thrust up out of her station.

That attempts have been made to do so, we have sufficient evidence in the zeal with which the superiority of morbid anatomy is advocated by some distinguished authors and lecturers; but it may be fairly put to these learned persons, whether observation and experience at the bedside, be not surer guides to successful practice than morbid anatomy? To estimate their relative value fairly, let us suppose we were compelled to rely *solely* on one of these branches, which would prove of the greatest utility? It has been ascertained, that a considerable progress may be made in knowing and curing diseases by the former source of information, independent of the other, but morbid anatomy *alone* would indeed be completely useless.

An expert anatomical pathologist can, perhaps, tell us what will be the state of particular parts or organs, if any given disease be not cured; but does this knowledge of itself contribute any thing to our power of curing the disease? Are not the *post mortem* appearances the same, or very nearly the same, when any appearances can be discovered, in all acute diseases, differing only in seat, viz. redness, congestion, effusion, and suppuration, the *effects* of unconquered disease?

We are no more assisted in our attempts to cure disease by the information that such will be the appearances, than by simply knowing that death will ensue, if we be not successful in our endeavours.

Many instances might be adduced of the insufficiency of anatomical pathology, in explaining the occurrence of symptoms of

disease; Dr. Armstrong very justly says, “ Delirium frequently occurs in bronchitis, but not in pneumonia and pleuritis, and it is more dangerous in the two latter affections than in the former,—a fact of which I am quite certain, though I am unable to explain it satisfactorily.”* Inflammation is said to be the proximate cause of both diseases; but what light is thereby thrown on this circumstance?

“ Bronchitis,” says Dr. Armstrong, “ has a determinate duration; and the man who tries to remove it, day after day, by repeated blood-lettings, attempts an impossibility, and always risks the patient’s life.”† Yet the mere anatomical pathologist, to be consistent, should in every case adopt the most vigorous means of subduing inflammation,

* Armstrong’s Lectures.

† Ibid.

wherever seated. The clinical physician knows that almost every disease has a "determinate duration," or rather a regular progress and natural termination; and he allows this knowledge its due weight in determining his remedial treatment.

Can the anatomical pathologist, by his most minute researches, account for the periodical accession and remission of the paroxysm of fevers, their tendency to terminate on particular days, or explain the variety of successive symptoms, depending, according to him, on one simple principle, inflammation?

In the progress of pneumonia, such a remission of the symptoms frequently takes place, and so flattering an appearance presents itself, as to lead an inexperienced practitioner confidently to prognosticate speedy recovery; the clinical physician

knows this appearance to be fallacious, whilst the anatomical pathologist can neither expect this occurrence, nor is able to explain it.

The greatest improvements which have ever been introduced into practical medicine, have been so introduced independent of anatomical pathology; they have invariably been the result of clinical observation. The cooling treatment in the confluent small-pox is a striking example of this fact. Sydenham has no claim to be ranked among the mere anatomical pathologists. Will morbid anatomy ever instruct us in the means of arresting hydrophobia and tetanus?

One great defect of anatomical pathology is, that it does not enable us to distinguish the effects of diseases from their causes; whilst, by the uniformity of appearances observed after all acute diseases, we are

induced too hastily to refer such diseases to one common principle of deranged condition, and to adopt one common principle of treatment, regardless of the essential characters of each separate disease, and inattentive to its distinctive and peculiar progress, its determinate duration and natural termination; yet it is the knowledge of these latter circumstances which is chiefly efficient in enabling us so to time our remedial treatment, as to insure a prospect of success.

It would scarcely be going too far to say that morbid anatomy has almost arrived at the greatest perfection of which it is capable, so far as practical medicine can be benefited by it. The immense number of dissections which have already been made and recorded, under every variety of fatal disease, leaves little more to be ascertained as to the general effects of different diseases,

when not controled by nature or by art. Derangement of structure, or impediment of function, is the natural result of unconquered disease; the anticipated certainty of these effects avails little to the knowledge of the means of cure.

How great a progress may be made in the knowledge of morbid anatomy by a few months reading and daily dissection, yet scarcely a single step be attained in the art of curing diseases; even the facility of predicting with the nicest accuracy the precise seat and extent of deranged condition, accompanying any train or succession of symptoms, is of itself *alone* of little use in enabling us to avert or remove them; whereas, attentive observation at the bedside, and repeated trials of remedies, may, independent of morbid anatomy, be the means of acquiring the power of controlling

disease. Incontrovertible facts, established by long experience, may often be turned to the best account by him who is totally ignorant of the explanation of those facts.

A person instructed a few months in morbid anatomy, would be able to predict with tolerable accuracy the seat and general morbid appearances in fatal cases of disease; and, so far as remedial treatment is influenced by this knowledge, would be as competent to treat diseases at an early period of his professional career as afterwards. The *ars longa* would have no special relation to the study of physic. But to become a proficient in the medical art, it is requisite not only to know the seat and general appearances of morbid condition, but to be intimately conversant with the infinitely varying modification of symptoms in their arrangement, combination, and pro-

gress, as influenced by age, sex, temperament, atmospherical changes, epidemical constitution, spontaneous and inexplicable access and declension of the same disease at different and remote periods, as well as the ever-varying effects of medicines, modified by the above causes, by idiosyncrasies, by the different doses, and by the immense variety of combination of individual substances. To attain this knowledge, indeed, and to render it available to practical utility, requires many years of assiduous attention, an innate talent of observation, a habit of close reasoning, a cautious induction of general principles from extensive and multiplied facts. It is the different degrees of this knowledge which constitute the difference of practical skill, a proficiency in which is to be attained chiefly by studying

symptomological pathology, and by clinical observation.

The advancement of medical science founded on these methods, is stable and solid. Had the attention of medical philosophers been confined solely to these sources of knowledge, medicine would have been in a more perfect state than it is at the present day. It is owing to the partial view we take of the successive series and intimate connexion of the various stages of disease, and to the too hasty generalisation of facts, that practical medicine makes such slow advance in the general march of knowledge. We are more prone to invent an hypothesis than to observe nature; and are too anxious to reduce medicine to a perfect science, before we have even arrived at a knowledge of its elementary principles.

Whether the opinions entertained by the Author be just and consistent with truth, and whether they will, if adopted, lead to a more successful practice, it is for others to determine. He is satisfied in having contributed his endeavour, however limited, to diminish the amount of human suffering.

Northampton Square, October 20, 1825.

AN
ESSAY, &c.

THE successful treatment of every malady must depend, in no inconsiderable degree, upon the correctness of our notions concerning its pathology and exciting causes; since our curative plans are commonly influenced by the views we entertain of the specific character and peculiar nature of the disease we have to combat.

An erroneous judgment of the actual condition of disease must unavoidably

lead to injudicious practice, because our indications of cure can only be deduced from our established principles of pathology. To confound with each other, diseases, or states of disease, essentially different in their nature and character, or to designate mere symptoms, or consequences of disease, as distinct and separate diseases, must be equally prejudicial, and will lead us to form false rules of conduct in regulating our remedial treatment.

It is a matter of importance, then, to acquire correct views of the true nature and essential character of a malady; to connect the actual condition of disease with the causes capable of producing it; and thence to deduce rational plans of curative treatment.

This is the just and natural order of proceeding, when we attempt to found our remedial treatment on pathological principles, the correctness of which, however, can only be ultimately decided by experience. The few observations about to be offered on the subject of water in the brain, will, consistently with this plan, be comprised under three general heads: the first will contain remarks on the character and distinctions of the malady; the second will embrace an enumeration of some of its most frequent causes; and the third will briefly expound the general principles of treatment, founded upon the views previously exhibited in the two former parts of the Essay.

Character and Distinctions.

THE term hydrencephalus which, in its strict etymological derivation, signifies effusion of a watery fluid within the brain; and the term hydrocephalus, which signifies effusion within the head, are commonly employed also to designate a series of symptoms preceding the actual effusion of water, and likewise those which are produced in consequence of the effusion. And hence arises the necessity of distinguishing the train of symptoms thus included under a term so comprehensively employed, into different stages, according to the successive order in which they appear.

It would undoubtedly simplify our notions of the pathology of this affection,

were we to confine the term hydrencephalus, or hydrocephalus, to its strict etymological signification, and employ it to designate merely the effusion, considering all the symptoms preceding actual effusion, however they may be produced, as the various causes of this effusion ; to the removal of which causes, our attention is to be directed, anticipating effusion as the final result of their continuance, should we be unsuccessful in our attempt to remove them.

This view of the subject would be analogous to our present notions of the pathology of dropsy generally, which is usually considered to be the result of previous disease of different kinds, rather than itself to constitute a distinct disease. The effusion may carry off, and be

the termination of the actual primary disease ; or it may exist with it, and add to the patient's danger. When it terminates the previous disease, we consider the dropsical effusion merely as it affects the comfort and convenience of the patient, and employ remedial means accordingly.

When effusion takes place in the cavities of the brain, during the progress of any disease, the danger is twofold ; not only does the hazard of the original disease remain undiminished, but the functions of the brain are disturbed and impaired ; and thus death may be produced, although the original disease might of itself have terminated favourably.

I am inclined to think that hydrop-

cephalus, or water in the brain, is an accidental circumstance, occurring during the progress of several diseases, and is produced by a variety of causes; and that its occurrence in this case depends on the predisposition or previous state of the serous membranes of the brain in the individual; and that therefore the essential character of hydrencephalus, when the term is employed to designate any protracted series of symptoms, consists in that previous state of membranes, or predisposition.

When we examine any history of the reputed disease, as given by authors, taking, for instance, that by Dr. Golis,* acknowledged to be one of the best, we

* Gooch's Translation, p. 38 *et seq.*

find an assemblage of symptoms enumerated, common to a very great variety of diseases, but can fix upon none which are certainly diagnostic of hydrocephalus, as a distinct disease, until the arrival of that stage which indicates actual effusion, the accidental effect of the operating causes, determined by the predisposition or peculiar state of the serous membranes.

That the effusion is accidental, determined by the predisposition, not an essential result of the existing symptoms, is evident, because these symptoms frequently continue for a long period, and sometimes terminate fatally, without producing effusion, in those children who are not predisposed thereto by the peculiar state of the serous membranes, viz.

too great irritability and too augmented circulation.

The different diseases, of which these various symptoms constitute a part, go through their natural progress, and terminate in their ordinary manner, when not influenced by the state of predisposition necessary to produce effusion. The worm or remittent fever of children has a regular progress, and appropriate terminations, of which effusion into the ventricles is not essentially one; yet in children possessing that state of predisposition already hinted at, effusion is a frequent termination of this fever. In the latter case, the whole train of symptoms, including the fever, is usually called *hydrocephalus*; whereas, in reality, the fever was not any essential part of

the hydrocephalic affection, but only an exciting cause.

The same reasoning may be applied to various other diseases, in which water in the brain is found to occur, or not to occur, according to the state of predisposition.

The terms incipient hydrocephalus and confirmed hydrocephalus, and the division of the series of symptoms into different stages, including those which obviously take place before any fluid is effused, are clearly inconsistent with this plan of restricting the term itself to the actual effusion ; but the extension of the term, so as to comprehend the very early symptoms of any disease which occasionally terminates in effusion, is also liable to many inconveniences, tending

to confuse our ideas of the pathology of the affection, and, consequently, to lead to injudicious modes of treatment.

We frequently find, for instance, children of five or six years of age attacked with symptoms of fever, — headach, vomiting, foul tongue, and constipated bowels, — all of which symptoms are removed by antimonial medicines and mercurial purgatives ; yet if these means are neglected, this febrile state is succeeded by effusion into the ventricles. Are these symptoms, then, at the first, to be termed incipient hydrocephalus, a peculiar, distinct disease of the brain, of which all the rest are symptomatic ? or is not rather the effusion to be considered, not as a distinct idiopathic disease, but the simple result of that general vascular excitement

which exists in the membranes of the ventricles in common with all other parts, but in the former in a greater degree, on account of some peculiar state, or of the more easy excitability of their vessels, arising from the operation of some of the predisposing or occasional causes?

When the term hydrocephalus is not restricted to the actual aqueous effusion, but is employed so as to embrace all the various symptoms of preceding disease, as well as that state of predisposition which leads to effusion with facility, from slight causes, independent of preceding distinct disease, we possess no means by which we can form a diagnosis of hydrocephalus; and hence arise the contradictory statements we meet with,

of the success experienced by different practitioners in their treatment of the supposed disease.

Those who in their definition of hydrocephalus include the early and premonitory symptoms, which are no more than the exciting or predisposing causes of that state of the serous membranes which leads to effusion, may boast of success scarcely to be expected by those who do not consider the disease as existing, until they see the approach of symptoms which appear later in the series. The mischief arising from thus confounding the causes of the disease with the actual disease itself, is sometimes not inconsiderable: did no other inconvenience result from it, than its leading us to form false estimates of our

power of curing hydrocephalus, it would be desirable that we should attempt a more accurate discrimination.

Some authors, as Mr. John Burns, speak of the secondary hydrocephalus. "The secondary hydrocephalus," says Mr. B., "is a very frequent disease, and is extremely insidious; the symptoms at first are *quite independent* of any affection of the head, and arise from dentition, disorders of the bowels, or other causes. But in the course of the disease so excited, *especially if it be attended with fever*, symptoms indicating a diseased state of the brain *supervene* with more or less celerity."* This accords with the view I have taken of the subject: when

* Principles of Midwifery, 3d Ed. p. 547.

predisposition exists to a certain extent, effusion into the ventricles of the brain takes place during the course of the original disease, whatever that may be, although in ordinary cases effusion forms no part of its usual progress.

Mr. Burns, also, speaking in another place of hydrocephalus, says, "It appears that the symptoms, when the patient can describe them, are, in the first stage, much the same with those of the common fever of the adult, or many of the febrile diseases of children, and that upon these *supervene* those of oppressed brain."*

It has frequently happened, that all the symptoms denoting the affection

* Principles of Midwifery, p. 542.

usually called acute hydrocephalus have been present, and the patient has been cut off; yet, on dissection, no fluid has been discovered. Cheyne, Quin, Warren, and Golis, mention such cases. It is evident that, in these cases, the symptoms could, at no period of the disease, be produced by effused fluid; and we cannot therefore, with strict philosophical deduction, conclude, that in other cases, where effusion has been ultimately discovered, the symptoms, precisely similar in appearance and progress, were owing to the effusion. We have, indeed, strong grounds for supposing that the effusion was the accidental, not essential, termination of the disease, which, in all the cases, was probably *fever* of some description, affecting the brain in a greater

degree than other parts—a circumstance usual in that disease; in various forms of which, and in typhus, among others, effusion sometimes takes place.

Were the train of symptoms denominated by authors acute hydrocephalus, the natural result or necessary consequence of effusion in the ventricles, or of that condition of the membranes which leads to effusion, why have we not similar febrile symptoms in those cases of epilepsy wherein effusion is discovered after death, and had apparently subsisted for a considerable time? Or why have we not a similar train of symptoms in cases of chronic hydrocephalus, in which effusion has subsisted for a long period? In all of these cases, as well the acute hydrocephalus as the chronic hydro-

cephalus and epilepsy, it would appear that the effusion is the result, not the cause, of the actual disease. In what is styled acute hydrocephalus, for instance, effusion is the result of that state of fever induced by some accidental cause; during the course of which fever, the vascular excitement in the brain becomes so great as to produce exhalation into its cavities disproportioned to the means of removal.

In favour of the opinion of hydrocephalus being an accidental occurrence, determined by the predisposition in the membranes of the brain, in all the various diseases of children, we may appeal to Dr. Cheyne, who, in treating of this affection, says, "I believe every different stage, certainly every different form of

the disease, requires a considerable difference of treatment." That is, the treatment must be adapted to the original distinct disease, during the progress of which, hydrocephalus may occur, if the patient possesses the requisite predisposition.

I could scarcely appeal to more decisive evidence of hydrocephalus being an accidental effect, occurring in a great variety of diseases, rather than, as Dr. Yeates terms it, a "specific disease," than to the statement given by Dr. Yeates himself. "The watery effusions which take place after scarlet fever, are produced in an analogous way to the effusion in hydrocephalus. There is no doubt of the great morbid congestion of

the extreme vessels in this disease, and the dropsical effusions are the consequences; if it be protracted, watery effusion most commonly takes place into some of the cavities, or cellular membrane. The very same appears to me to occur as cause and effect in hydronephalus; if the complaint be speedily removed, we have not usually those symptoms which denote effusion into the ventricles; if the child survives with a protracted disease, the symptoms connected with effusion occur. The analogy appears to me very striking, as far as the morbid congestion of the extreme vessels and deposition of fluid are concerned; and it is not at all uncommon to have *strong symptoms of water in the brain*

after scarlet fever. I have frequently witnessed them.”*

Whether it be scarlet fever, or whether it be any other febrile affection, if there exist great vascular excitement in the brain, and great irritability in that organ, effusion may take place as an accidental occurrence. Effusion is not the result of a particular specific disease, distinct from general fever. Indeed, those who maintain a contrary doctrine are necessitated to assign the final event (effusion) as the only diagnostic; and, accordingly, when this event has not occurred, they term the disease one *resembling* hydrocephalus; and oftentimes

* Early Symptoms of Water in the Brain, p. 124.

when they have assured themselves of the existing disease being properly and specifically hydrocephalus acutus, dissection has demonstrated the brain to have been perfectly free from any affection whatever.

When, in the chronic form of hydrocephalus, the further easy distension of the cavities, either natural or factitious, is prevented by the resistance of the bones of the skull, unequivocal symptoms of hydrocephalus take place, and the disease proves fatal, as in cases of the acute form, but without the accession of those febrile symptoms which accompany the early stages of this latter; affording us another opportunity of distinguishing the essential characteristics

of hydrocephalus from the accidental circumstances which precede or accompany its attack.

The attack of the infantile remittent fever, and also of the worm fever of children, is very similar to, or altogether identical with the attack of acute hydrocephalus, considered as a distinct disease. Indeed they cannot be distinguished until symptoms arising decidedly from the pressure of effused fluid, are present. The event or termination of these cases is frequently our only guide in distinguishing them from each other. When the fever subsides, and the patient is restored to health, it is inferred by practitioners, that the disease could not possibly have been hydrocephalus; when death ensues, and effusion in the ven-

tricles is discovered, they decide that the whole train of symptoms had arisen from the affection of the brain, and denominate the complete series hydrocephalus.

On the other hand, we frequently discover effusion to have taken place in the ventricles, without any febrile symptoms having manifested themselves; so that we cannot justly consider effusion in the brain as the proximate cause of the febrile symptoms in any one case. The same proximate cause must at all times produce the same disease, which disease can never be present without the very same proximate cause, conformably to the acknowledged definition, "*causa proxima est illa quæ præsens morbum facit,*" &c.

Viewing, then, dropsy of the brain as

a mere effect of a certain state of the serous membranes of that organ, and this state being in some cases produced during the progress of disease, and in other cases taking place from various causes, when no distinct disease is produced,—it becomes important to ascertain when this state of membranes actually exists, and by what symptoms it is to be discovered.

Dr. Whitlock Nicholl, in his excellent little treatise, entitled “ Practical Remarks on Disordered States of the Cerebral Structures occurring in Infants,” has taken a somewhat similar view of this affection, referring its essential character to a peculiar state of the brain, which he denominates “ erethism.” It may be questioned, however, whether his division of

erethism into sensitive and torpid, does not involve a contradiction. He attributes the occurrence of "an assemblage of symptoms, to which the general term *fever* is applicable," to this erethismal condition of brain; whereas, I am of opinion that this state of brain is not itself productive of fever, but only contributes to the facility of effusion, when fever is produced by other causes, as by worms, costiveness, &c.

Two conditions of brain may be considered as more particularly predisposing to effusion taking place during the progress of acute disorders in children, viz. a greater rapidity of circulation in the vessels of the brain, and an excessive degree of irritability of the organ; and these states may exist either separately

or combined, the danger of effusion being greater in the latter than in the former case. These states do not of themselves constitute disease, and may exist for a considerable time without any of the functions of life being impaired or interrupted, and are indeed compatible with the most perfect performance of such functions as are chiefly appropriate to the cerebral organ.

We observe, at a very early age, dissimilar habits of both mental and bodily activity in different children; this difference, although not produced by any configuration or conformation of the brain, is accompanied by certain states or conditions of that organ, which may give rise to the more or less perfect performance of its appropriate functions.

The facility of performing the functions of any organ, seems, in a great measure, to be regulated by the freedom and rapidity of circulation within that organ.* Children in whom is observed an unusual activity of disposition, may therefore be presumed to evince a more developed state of circulation than ordinary

* This is evinced by the increased power of intellectual exertion which follows a moderate use of wine, or other stimulants increasing the free circulation through the brain. Our greatest orators, and many of our highly esteemed poets and musicians, have been indebted to this aid for some of their most brilliant displays: witness, Pitt, Fox, and Sheridan. If, instead of free circulation, there had existed undue contraction of the vessels in the brain, resisting the increased flow, disease would have been the consequence of such stimulant practice, viz. delirium, phrenitis, or mania.

within the brain; and this increased state of circulation must necessarily be productive of a greater tendency to exhalation into its serous cavities; and although the proportion between exhalation and absorption may for the most part be duly observed, yet this due proportion will be more easily destroyed or deranged, and that by slighter causes, than in a brain possessing less vascularity of structure, and less activity of circulation.

When there already exists in any individual a great rapidity of circulation within the brain, or an undue irritability of that organ, these states are respectively augmented by most diseases attacking the system, and by various exciting causes, independent of distinct disease. What-

ever increases the circulation generally, must produce the same effect within the cranium, and thus add to the supply of moisture from the exhalants in the cavities of the brain. All the febrile diseases of children, therefore, by increasing the circulation within the brain, may conduce to accumulation of fluid in the ventricles with greater facility, when this predisposition has previously existed.

Undue irritability of any organ necessarily occasions a proportionate degree of augmented circulation in that organ; and in proportion to the activity of the circulation is the discharge by the exhalants. Irritability is frequently produced, and is invariably kept up, by a state of *debility*. It is, accordingly, in children of weakly constitutions, or who

have been rendered weak from debilitating causes, that effusion is commonly produced during the course of infantile disorders; the same disorders terminating in other children, who do not possess this predisposition, either in recovery or death, without effusion taking place.

In proportion to the weakness of constitution, is the irritability of the system; so that not only is disease produced by slighter exciting causes, but when there exists disproportionate irritability of the serous membranes of the brain, effusion more readily takes place in all the various diseases of children. This state of irritability of the system generally, and of the membranes of the brain in particular, it is, I suppose, which Dr. Yeats intends to express by “constitutional

predisposition to morbid action,"* and "the disposition in the brain to put on the action generating hydrocephalus;"† terms, however, much too vague and unphilosophical to convey any precise notion of the general condition of the system, or of the state of the cerebral organ.

This peculiar predisposition of the brain, which conduces to effusion into the ventricles during the progress of infantile diseases, has been called by many persons chronic inflammation; and the diseases themselves have frequently been considered to depend upon an augmented state of that affection; so that inflammation has been said, indeed, to be the

* Early Symptoms of Water in the Brain, 2d Ed. p. 23.

† Ibid. p. 24.

proximate cause of hydrocephalus. This is a subject which deserves investigation, and into which I shall briefly enter.

Much ambiguity has arisen in assigning the proximate cause of effusion into the ventricles, for want of a distinct and characteristic definition of inflammation. While this word is employed, as is too commonly done, to designate the merely increased action of the vascular system, or of some part of it, without the presence of that condition which is essential to inflammation, viz. resistance to the increased impetus, we shall be very likely to have effusion in the ventricles attributed to this cause (inflammation), because increased vascular excitement commonly precedes increased flow from the exhalants.

Dr. Quin appears to have felt the difficulty of supporting the doctrine of inflammation being the proximate cause of hydrocephalus, from the want of distinguishing between merely increased vascular fulness, and vascular fulness combined with resistance, constituting inflammation. "There is," says he, "indeed, one circumstance which may seem very much to invalidate the reasoning I have fallen into through the course of the present treatise. An opponent may ask, if your position is true, that the *apoplexia hydrocephalica* arises in the first instance from a morbid increase of blood in the vessels of the brain, why do the symptoms in any respect deviate from those undoubtedly proceeding from the same cause in *phrenitis* and *apo-*

plexy? — To this objection,” he adds, “I confess no very satisfactory answer can be given.”* The answer would be found in the distinction I have endeavoured to establish above.

Another error, also, into which some practitioners fall, is the calling by the name of *hydrocephalus acutus*, those diseases of the head which are actually and decidedly inflammatory; confounding together diseases which are in themselves essentially different, and inferring, without sufficient grounds, that when effusion is detected, there must have been inflammation; and that when inflammation of the brain or its mem-

* Treatise on Dropsy of the Brain, p. 56.

branes is present, the disease must be hydrocephalus.*

* An example of this error is to be met with in the Medical Repository for March 1814, and I mention it merely as an example of a common error. A case is there related by Mr. Bond, of a true inflammatory disease of the membranes of the brain, in a child, when, on dissection, a very trifling quantity of fluid was found in the ventricles, not sufficient, certainly, to account for death, which was undoubtedly owing to inflammation, and of which decisive evidence was discovered, viz. the genuine products of that process—turbid fluid, deposition of coagulable lymph, and thickening of the membranes. During life, also, there were signs of “intensity of inflammatory action.” This case differed materially in its progress from the ordinary cases of hydrocephalus acutus, yet the author designates it by that name, apparently because it did exhibit signs of active inflammation; and he unequivocally includes

But a little consideration might induce us to take a different view of the matter.

Phlegmonous inflammation of the brain, if it attacks the membranes, is attended with acute, throbbing pain, and severe symptoms of general inflammatory affection of the system. If the substance of the brain is affected by this inflammation, these symptoms are often very slight, and the pain obscure and sometimes but just sensible. In both cases, unless resolution speedily takes place, the disease terminates in suppuration, especially when the substance of

hydrocephalus acutus among the phlegmasiæ, when he says that “it is not, if it meet with early and proper attention, more hazardous than some other phlegmasiæ.”

the brain is affected; for when the investing membranes are inflamed, death frequently ensues from the accompanying symptoms of irritation, or irritative fever, previously to the process of suppuration being completed. Dissection in fatal cases of this description discovers not aqueous effusion, but the most decisive marks of inflammation; whereas, if aqueous effusion depended upon inflammation, the quantity of fluid should be greater in proportion to the intensity of the inflammation; here the appearances are not confined, as in hydrocephalus, to mere vascular fulness. This fact must, therefore, lead us to conclude, either that the effusion into the ventricles in hydrocephalus has not been preceded by inflammation, or that

the inflammation is of a very different and distinct character from the ordinary inflammation of the brain and its membranes.

I am inclined to think that the former conclusion is the true one; for something more is requisite to constitute inflammation than merely increased circulation. While the blood continues to flow freely through a part, no inflammation is produced, whatever be the quantity transmitted to it; it is when resistance is offered to the transmission through some of the vessels, that inflammation follows: the balance between the quantity sent to the part, and the disposition in the vessels to receive that quantity, being deranged, a state of disease commences; the resistance to the

flow of blood acts as a stimulus to the vessels conveying that blood, and incites them to increased action, which still further augments the quantity of blood in the part, whilst the resisting force not yielding to the impulse, symptoms are aggravated, and the mischief proportionally increases. Not only is the resistance not diminished by the additional impulse of blood, but it is actually augmented; the endeavour to distend the resisting vessels increasing their state of contraction, whereby their further distension is prevented. Should this struggle long continue, and the removal of such obstructing cause not be accomplished, other effects are produced, which constitute the different stages and terminations of inflammation, viz. effusion

of coagulable lymph, adhesion, or sup-
puration.

In *post mortem* examinations, we are very apt to consider every appearance of increased vascularity in a part, as evidence of previous inflammation; but if the observations above offered be correct, we frequently err in doing so. Signs exist, indeed, of increased circulation having taken place, but whether this has been accompanied by inflammation, we have no means of determining, unless we trace the results of inflammation,*—ad-

*. Increased strong action of the vessels will, without the presence of actual inflammation, occasion the transmission of lymph, containing more coagulable matter than circulates through them in their ordinary state, and hence arises a certain appearance of opacity in membranes which are na-

hesion, effusion of coagulable lymph, or suppuration. In fact, the symptoms which manifest themselves during life, are the only criterion by which we can determine the previous existence of inflammation, when none of the appearances I have mentioned as being consequent on inflammation, are detected in our *post mortem* researches.

The fashion of the day is to refer almost all diseases to “inflammatory action”—a term which, not having been strictly defined, we are unable correctly to appreciate; but the very name has a marked influence on medical practice,

naturally transparent, as in the *septum lucidum*, in some cases of effusion into the ventricles; but even here, I should contend, that there exist no signs of inflammation, but of increased action only.

causing us to confine the treatment of most disorders to measures of evacuation and depletion, as the sole means of subduing the fancied inflammation. The mischief arising from this hypothesis is little less extensive than what was formerly produced by the Brunonian theory, as, like that, it supersedes the necessity of discriminating the shades of difference actually existing in the essential characters of various diseases, and estimates them only as they exhibit more or less of inflammatory action, the degree of which is to determine the extent of the means to be adopted.

But captivating as is this theory, it has no foundation in nature; many diseases although they exhibit in their progress, signs of what has thus been called inflammatory action, do not de-

pend upon this state for their essential character. And it is accordingly found, that, in a great number of instances, subduing this inflammatory action does not cure the patient; a symptom or two, it is true, may be relieved, but the disease still goes on, while we continue (blinded by our hypothetical notions) striving to subdue the formidable hydra, which, although no longer manifesting its existence by evident signs, we still consider as lurking in ambush.

Few diseases continue for any length of time without producing, some more early than others, temporary excitement of the system and increased activity of circulation, which, indeed, are often the means employed by nature for averting or removing the mischief consequent to the action of various external agents

upon the system : these states, thus produced, may frequently be moderated, when excessive, by abstraction of blood, although the disease producing them may still be going on. Hence the apparent utility of blood-letting in various diseases ; but this alleviation of symptoms is oftentimes obtained at the expense of considerable waste of strength, which renders the system incapable of sustaining the force of the actual disease during its determinate progress, and diminishes the chance of its natural and spontaneous termination.

If, as has been said by physicians of great eminence and deserved reputation,* inflammation of the brain is the proximate cause of typhus fever ; and if,

* Dr. Clutterbuck and his followers.

as has been said by Dr. Golis, the second stage of hydrocephalus acutus is also dependent on inflammation of the same organ; upon what foundation does the diagnosis between hydrocephalus acutus and typhus in children, as drawn by the latter author,* rest, and to what practical conclusion does it lead? It is, in effect, an attempt to distinguish inflammation of the brain from inflammation of the brain, or to establish some specific difference of inflammation in the two cases, not in degree, but actually in kind. A difference in degree could only require a difference in the extent of remedial means, the essential characters of hydrocephalus and of typhus would be the same. Effusion into the ven-

* See Dr. Gooch's Translation, p. 55.

tricles may occur during the progress of typhus, and it may also occur during the progress of that train of symptoms designated by Dr. Golis the second stage of hydrocephalus; the result being alike in both cases, we have no ground to infer a specific difference of inflammation.

But inflammation of the brain is not an essential character either of typhus or of hydrocephalus. Phrenitis,—in the fatal cases of which disease we discover, on *post mortem* examination, *decided* marks of inflammation,—produces a train of symptoms widely different from those observed either in typhus or hydrocephalus. In fatal cases of the former (typhus) we oftentimes discover no traces of affection of the brain whatever; and in the latter (hydrocephalus), no other

appearance than the mere effusion, or, in some cases, signs of increased circulation, of which the increased exhalation is the natural consequence.

The effusion into the ventricles of the brain, in genuine hydrocephalus, appears to consist of merely aqueous fluid, not coagulable, nor containing either albumen or fibrin. The character of the fluid, therefore, distinguishes it from the product of inflammation, as the effusion resulting from this latter affection always contains coagulable matter.*

* In peritoneal and ovarian dropsy, arising from membranous inflammation, the fluid is not only easily coagulable, but portions of it are frequently found actually coagulated, so as to impede its passage through the canula in the operation of tapping, and long stringy shreds may be drawn out by

In some cases, however, described by writers on this malady, the effused fluid has been found coagulable, and of various degrees of turbidness. This occurs chiefly in that form of the disease denominated by Dr. Golis "the tumultuous," in which there appears to be well-marked increased strong action of the vessels of the brain; of which increased strong action, augmented effusion is the natural consequence, as well as a greater proportion of coagulable lymph. But even here there is no decisive evidence of inflammation having taken place; the fatal termination may be justly attri-

the fingers. On dissection, in such cases, decided marks of inflammation are usually discovered, viz. altered structure, thickening and accretion of membranes, by means of effused coagulable lymph.

buted to the rapidity of the effusion suddenly altering the condition of the brain, and rendering it incapable of performing those functions, without which life necessarily becomes extinct.

The accession of inflammation, or second stage of hydrocephalus, is said by Dr. Golis to be preceded by a state of turgescence, indicated by various premonitory symptoms; but these symptoms I should rather consider as indicating irritability of the membranes of the brain, and increased circulation in their vessels. Mere turgescence may, and very often does, exist when the circulation is impeded and is considerably slower than natural, and the consequent symptoms are altogether different from those premonitory of hydrocephalus.

There are certain symptoms which indicate the existence of that state of the serous membranes of the brain, wherein effusion is produced with great facility, either from some occasional cause operating directly or indirectly on that organ, or from the increased circulation produced by some disease, in which the serous membranes participate equally with all other parts. These symptoms are styled *premonitory*, and are the result of that state of predisposition, either existing from birth, or induced by accidental causes, slowly operating on the membranous tissues of the brain.

The premonitory symptoms which, in children, denote undue irritability of the brain, or increased circulation through

its vessels, without the presence of actual disease, are, great wakefulness, great sensibility to slight impressions, with restlessness, and animation in a high degree; the retina of the eye is particularly sensible to light, and the pupil is sometimes much contracted; the child becomes fretful, and often cries without any apparent cause. In this state of brain, the organ readily manifests sympathetic affection with diseases of any part of the system; that is, slight causes of disease readily produce disturbance of the cerebral functions. Whenever fever arises from worms, dentition, costiveness, or any other cause, the brain participates in a disproportionate degree, and effusion is often the consequence; when, under

a different state of the cerebral membrane, no such effect would have followed.

Dr. Yeats, in his treatise on the Early Symptoms which lead to Water in the Brain, strenuously urges attention to these symptoms, in order to prevent effusion taking place; as if they were only to be regarded dangerous as they contribute to this event. But cases frequently occur, in which, although the symptoms have arisen to the highest state of aggravation, no effusion has taken place; proving that these early symptoms are manifestations of some distinct disease, having its own proper character and progress, during which, indeed, effusion may accidentally occur, and thus add to the danger, by super-

inducing another disease to the already existing one, and rendering the chance of recovery less, the patient now having to struggle with two diseases instead of one.

When this predisposition is of long continuance, or has existed from birth, hydrocephalus may take place from causes operating immediately on the brain itself, without any intermediate general affection of the system; and this variety of the disease has been called *chronic*. In this form of the disease, those symptoms attendant upon the latter stages of acute hydrocephalus manifest themselves; these symptoms, being characteristic of pressure on the brain, are essentially those of the dropsical effusion; whilst the symptoms denomi-

nated those of the first and second stages of acute hydrocephalus, never having taken place, demonstrate that such early symptoms are no essential part of the affection, but are those of some other distinct disease, operating as a cause of the hydrocephalic state of the brain.

Those who maintain the existence of acute hydrocephalus as a distinct specific disease, and date its commencement from the first apparent deviation from health, dividing the train of symptoms into different stages, have indeed laid down some diagnostic signs whereby to distinguish this specific disease from those others which they confess it so closely resembles, but, as far as I can perceive, without much success. Mr. John

Burns (one of these authors) distinguishes the early stage of hydrocephalus from infantile remittent fever, by the pulse in the former being more irregular; "It often beats alternately quick and slow for two or three pulsations."* He distinguishes it from worm fever, by there being more frequent vomiting in the former; and he says, that in this fever, "There is in general more complete remission of the symptoms, at some time of the day, than in water of the head, the pulse not only being slower, but the child more lively."†

I apprehend, all we can infer from this is, that when there already exists in the serous membranes a predis-

* Principles of Midwifery, p. 597.

† Ibid. p. 601..

position to effusion, as before mentioned, which predisposition consists in increased vascular excitement and irritability of the membranes, they become more readily and more early affected by the general febrile excitement of the system, than they would otherwise be, and thus modify, in some degree, the appearance of the symptoms of the fever, although such state of the membranes formed no part of the exciting cause of the fever.

This variation in the symptoms indicates the predisposition in the brain, and may point out the danger of effusion, but it does not constitute a distinct disease. The effusion, in these cases, when it takes place, is *subsequent* to the attack of fever, and is determined by the predisposition in the brain to be

affected in a greater degree than the rest of the system.

In the latter stages of hydrocephalus acutus, the symptoms denoting effusion into the ventricles are commonly combined with those of the original disease, or with those denoting that peculiar state of brain which gives rise to the facility of effusion; and either set is in itself a source of great danger.

The characteristic signs of effusion are those which denote pressure on the cerebral organ, from whatever cause arising. General torpor and paralysis, strabismus or squinting, dilated pupils, unaffected by strong light; when these are combined with, or superadded to, the symptoms of the original disease, the danger is greatly augmented, and it is

seldom that, under these circumstances, recovery is witnessed; although it not unfrequently happens that either of these states, when existing alone and uncombined with the other, may terminate favourably.

That form of the disease denominated “water stroke” by Dr. Golis, seems to differ from other forms of it only in the rapidity of the effusion, and in its arising from causes acting immediately upon the brain, not occurring during the progress of some general affection of the system. That form of the disease denominated by him *hydrocephalus acutus*, seems to embrace not only the actual effusion into the ventricles, but also the symptoms of some general disease of the system, during the progress of which,

effusion may or may not take place, according to the state of predisposition, or other circumstances favouring this event.

It is probable that when effusion takes place, the danger is in proportion to the rapidity of the effusion, rather than to its actual quantity; as when it takes place slowly, the brain may gradually accommodate itself to the pressure, and time is allowed for the removal of the fluid. When the effusion is suddenly large, as in the water stroke, the functions of the brain are at once speedily overwhelmed, and death ensues. Accordingly, the water stroke is invariably fatal; the acute hydrocephalus may occasionally be cured; that is, in my view of the matter, the general disease of the system may be conquered previous to

effusion coming on. In the water stroke, the effusion taking place as the direct effect of the exciting cause, without any intermediate general disease of the system, and occurring with great rapidity, the case is rendered hopeless. Water stroke is the actual original disease, not the accidental termination of some other disease.

This distinction between the water stroke and the acute hydrocephalus, is still further illustrated by Dr. Golis's assignment of the causes of each respective form. The metastasis of various diseases, he says, is more frequently a cause of the water stroke; he has often seen suddenly suppressed diarrhœas and dysenteries followed by the water stroke, in rarer cases, by acute hydrocephalus.

In these cases, disease is suddenly transferred to the brain, and this organ does not appear to be consentaneously affected, as in those febrile affections, terminating in effusion, in which the brain participates during the whole course of the disease.

The appearances observed in the brain on dissection, after the water stroke, differ considerably from those discovered after hydrocephalus acutus. In the former case, the brain is very little altered from its natural state, either as to consistence or vascular condition; in the latter, the blood-vessels are larger, and the brain less firm than ordinarily.

How far this altered state of the brain is to be considered as the cause or the effect of effusion, it is difficult to say.

In chronic hydrocephalus, the alteration from the natural state of brain is still greater. Dr. Golis says, he almost always saw "The turgescence of the blood-vessels and the consistence of the brain in exact relation to the duration of the disease; that is, the shorter the disease, so much the firmer and more consistent was the brain, and so much less enlarged and less turgid were its blood-vessels. Even so was it with the elasticity of this viscus; the quicker and earlier this disease occasioned death, so much the more, after the skull-cap was taken off, did the brain rise."*

This would induce me to believe that the altered structure of the brain was

* Gooch's Translation, p. 183.

the effect of the effusion. When effusion takes place with great rapidity, as in the water stroke, the functions of the brain are so immediately impeded by the unaccustomed pressure, as speedily to prove fatal. When effusion takes place gradually, the brain has time to accommodate itself to the gradual pressure, and to preserve its functions entire. Accordingly we find in protracted cases of chronic hydrocephalus, that the firmness and elasticity of the brain are very considerably diminished, and, in some instances, that much of the substance itself of this organ has been removed, leaving little more than a mere membranous bag or cyst, containing the effused fluid.

Causes.

THE causes of water in the brain may be divided into predisposing and occasional or exciting; and these latter may be further divided into such as act primarily on the brain, and into such as act primarily upon the general system and remotely on the brain; or, as it is sometimes termed, by sympathy. Many of these causes are at once efficient, both in inducing the predisposition and exciting the actual effusion. In enumerating the causes, therefore, it will not be necessary to class them very strictly, but it will be sufficient to enter into a brief consideration of those circumstances which more frequently give

origin, either as predisposing or exciting causes, to the affection in question.

Fever, of whatever description, is one of the most frequent causes of effusion in the brain, and this result is not uncommonly discovered to have taken place, when we examine persons who have died of that disease. In children, particularly, we find hydrocephalus to result as a consequence of scarlet fever, a disease attended with a very considerable degree of vascular excitement, and in which the brain usually appears to be affected to a more than ordinary degree, as is evinced by the delirium which takes place even in comparatively mild cases of scarlatina.

We do not find, however, that after an attack of small-pox or measles, when

considerable hectic fever or chronic debility remains, there exists a greater disposition to hydrocephalus,—it not being a frequent sequela to those diseases. This is owing, probably, to the state of contraction prevailing throughout the vascular system, and the exhalation being consequently diminished. In simple weakness, on the contrary, accompanied by universal relaxation of the vascular system, this affection is not an unfrequent occurrence.

In children who are of very weakly constitutions, or of a scrofulous diathesis, where there exists a considerable relaxation of the lymphatic system, it is probable that, in consequence of the relaxed state of the exhalants, effusion may take place into the ventricles of the

brain, disproportioned to the powers of absorption; and the accumulation may be so gradual as to allow the brain to accommodate itself to the increased pressure for a certain time, until mechanical resistance is offered to further distension, and then symptoms are produced strictly those of hydrocephalus, inasmuch as they follow, not precede the effusion.

In proportion to the irritability of the system is its liability to be affected by the exciting causes of diseases. Fever, therefore, more frequently exists in children, and is easily produced by very slight causes, as by fatigue, dentition, worms, &c. And hence arises a source of much error and ambiguity, because the fever thus produced, and of which

effusion is sometimes the consequence, is mistaken for and denominated the early symptoms of hydrocephalus, by those who contend for its being a distinct and specific disease. But, as precisely the same symptoms frequently arise from the same causes, and are not attended with or followed by effusion, it is incumbent on those who discriminate between this train of symptoms and the specific disease (hydrocephalus), to offer some diagnostic signs whereby to distinguish the latter, previous to the arrival of the actual effusion, which has never yet been satisfactorily done.*

In proportion also to the irritability of different parts, is their liability to be

* See p. 56.

affected by the fever in a greater degree than other parts; for fever, although a disease of the whole system, affects various parts with different degrees of violence. When there exists, then, any unusual irritability of the brain, as is the case in weakly children, and in those possessing naturally great vascular fullness in that organ, the fever affects the brain in a disproportionate degree, and exhalation into the ventricles is the natural result of the increased circulation produced by the fever.

Costiveness may be considered as a frequent occasional or exciting cause of hydrocephalus. It may operate in two ways in producing this affection: *first*, by causing a greater determination of blood to the head, and thus increasing

that vascular excitement so apt to take place in children already predisposed to the disease; and *secondly*, the fever which frequently results as the consequence of retention of fæces, may affect the brain in a greater degree than other parts, it being a usual concomitant of proper fever to affect different parts with greater or less degrees of intensity, and thus endanger effusion into the cavities of the brain.

Whatever increases the already excessive irritability of the system, or any of its parts, must be highly prejudicial, predisposing in an eminent degree to hydrocephalus when fever is in any way produced, and at the same time rendering the susceptibility to fever greater than it would otherwise be, when any

exciting cause is applied. Weakness is, in every instance, accompanied by an increase of irritability, and therefore all those causes which in any manner produce weakness must act as predisposing causes to hydrocephalus. In the ordinary diseases of children, as the exanthematous fevers which usually attack them, we ought to be cautious not to carry our depleting and evacuating measures further than absolute necessity requires to subdue the disease, as any excess in this respect, by occasioning weakness and greater irritability, renders the system more easily susceptible of fever from slight causes, as costiveness, fatigue, worms, &c.; circumstances which in a strong child would be unattended with fever; and when fever is produced,

it renders the disease more prone to be irregular, and thus endangers increased determination to the head, and augments the hazard of effusion. Blood-letting and other depletory methods, are certainly carried to a much greater extent than formerly, in the diseases of infants: how far the more frequent occurrence of hydrocephalus now than heretofore, is connected with this practice, I leave to be determined by those more competent to the investigation than myself.

Mercury is known to increase the frequency of the circulation; it also increases the irritability of the whole habit, occasioning the different parts to be more readily thrown into inordinate action, on the application of ordinary exciting causes. This medicine, injudi-

ciously administered, may, therefore, produce such augmented circulation within the brain, and such a condition of that organ, as to give effect to much slighter causes, tending to disturb the balance between exhalation and absorption, than would otherwise be the case; and in this manner may lay the foundation for an attack of this affection, which, under more favourable circumstances, would never have appeared.

As a rapid and more developed circulation within the brain, when existing naturally, is productive of a greater facility of performing the appropriate functions of that organ; so is excessive action of the organ itself, from whatever cause arising, productive of increased circulation within the brain, constituting

that state in which the exhalation into its serous cavities is augmented, and the disposition to effusion preponderates. Forced excitement, therefore, of the powers of the mind in children, cannot but be highly prejudicial, as tending to produce that increased circulation in the brain, which strongly predisposes to hydrocephalus.

The present mode of education, in which the intellectual powers are prematurely exercised, may be considered as one of the causes of the more frequent occurrence of the affection in question. We are not content with suffering the faculties of the mind to develop themselves in the successive order intended by nature, but we vainly

attempt to subvert that order; and in our endeavour to convert the child into the man, we not only stunt the intellectual capacity, but we frequently lay the foundation of corporeal disease.

Concussion, or agitation of the brain, may be considered as one of the exciting causes of hydrocephalus, and is said by Dr. Golis to be a very frequent one. The early symptoms, indeed, of hydrocephalus, taken in the extended application of the term, very greatly resemble those arising in concussion produced by external violence, such as vertigo, vomiting, &c. But a state of concussion is not, at the present day, considered as a state of inflammation, nor are the remedies employed by practitioners of the

greatest eminence, those which are ordinarily recommended in inflammation.*

Sir Astley Cooper, I think, says, in his lectures, that in the early part of his medical life, when concussion was treated by depletory measures, the result was far less satisfactory than at present, when the practice is to abstain from such measures, and to trust to rest and quiet and mild refrigerants.

It is acknowledged on all hands, that blows on the head, although not very violent, may become exciting causes of this affection; yet the explanation of

* In concussion, says Sir Astley Cooper, there is sometimes a change in the circulation of the brain, not organic injury; so I should say, that in what is called incipient hydrocephalus, there is only increased circulation, not inflammation.

the mode in which they produce their effect, given by some authors, is extremely unsatisfactory. Dr. Yeats, for instance, says that "Blows upon the head, however apparently trifling, will lay the foundation of this complaint by a DISEASED IMPRESSION on the liver and digestive organs."*

When symptoms of concussion take place from violent injuries, we do not, in ordinary cases of that complaint, resort to this reflected operation to account for the occurrence. The symptoms of concussion and those primarily arising in hydrocephalus produced by blows, are similar in appearance, and there can be little doubt, the state of the cerebral

* Statement of Early Symptoms, &c. p. 24.

vascular system is in both cases the same, consisting of undue fulness in some portion of that organ. And although in ordinary concussions we employ purgatives to diminish the determination of blood to the head, we do not attribute their utility to any effect they have in removing "morbid action" in the digestive organs.

That this latter set of organs may become disturbed, during the progress of a disorder originally affecting the brain, is easily conceived; but I confess I do not so readily understand, why a blow inflicted upon the cranium should not affect the organs contained within the cranium until other organs, remotely situated, have become *previously* diseased in consequence of such blow.

As those causes which produce slight concussions of the brain, as falls and blows upon the head, are followed by the early symptoms indicative of the predisposition to hydrocephalus, nothing can be more improper than to strike children on the head, as even a blow not very violent may, in a child predisposed to the complaint, produce its immediate accession. The subjecting young children to very violent motions, as roughly throwing them up in the air, and the like, as practised by some nurses, is highly injudicious, and is occasionally followed by disastrous consequences.

It has been said by some authors, that hydrocephalus frequently arises from *sympathy* with diseases of the liver.

This assertion is not corroborated by the result of Dr. Golis's cases, as he no where makes mention of any affection of this viscus, although he appears generally to have opened the abdomen in his dissections, and reports, for the most part, a healthy condition of *all* the abdominal viscera.

Dr. Cheyne is a strenuous supporter of this hypothesis of sympathy; and Mr. Thomson, of Sloane Street, reports a very different result of his anatomical investigations from that of Dr. Golis, having, as he says, found inflammatory affection of the liver in nine dissections out of eleven. This discrepancy is rather remarkable. It is surprising how easily matters are explained to the

satisfaction of those who are determined to see one side of the question only. Dr. Cheyne says, Mr. Thomson has added a *faithful* account of the manner in which the disorder is transferred from the abdomen to the brain. Mr. T.'s account, I believe, is as follows:—

“ In persons predisposed to this disease, the brain appears to be in a peculiar state, which may be denominated the *hydrocephalic*, in which its vessels, when excited by *morbid* conditions of the abdominal viscera, *take on an action*, which terminates in effusion of an aqueous fluid into the ventricles.” I confess I am so far from understanding, by this description, the *manner* in which the disorder is transferred, that I consider

the whole paragraph to be any thing rather than an explanation.*

When we say that water in the brain arises from sympathy, we can mean nothing more than that the general vascular excitement, which is usually the effect or concomitant of most diseases, is more evidently displayed in the brain, in individuals already predisposed to undue vascular excitement in that organ, in whom, of course, slighter causes will

* Every function in the system may in this manner be *easily* explained. The eyes, for instance, appear to be in a peculiar state, which may be denominated the lachrymal, in which their vessels, when excited by the stimulus of a sharp east wind or the effluvium of an onion, take on an action, which terminates in the effusion of an aqueous fluid over the cornea.

operate, than in those possessing a different condition of brain.

In proportion to the irritability of the serous membranes, is their disposition to be thus affected; and it is accordingly in children of weakly and irritable habits that we find hydrocephalus to arise as sympathetic of, or consequent to, various febrile and inflammatory diseases.

It must be admitted, that affections of the brain certainly do arise frequently from what has been denominated sympathy; that is, when some other part of the animal system suffers under any deviation from its natural and healthy state, the functions of the brain become disturbed and interrupted; and this takes place whatever be the part of the system affected. This circumstance is

not to be wondered at, considering that the brain is the centre and probably the origin of all nervous influence, although the mode in which this sympathetic influence is exerted remains inexplicable.

It is by this power of sympathy that diseases, originating in some of the contained viscera of the abdominal cavity, sometimes give rise to hydrocephalus, or rather to that state of the brain in which effusion is readily produced; for, as has been observed, all the symptoms ordinarily characteristic of hydrocephalus ⁷²⁵ *acutus* have been manifested, when no traces of the actual existence of this affection have been discovered on dissection.

This influence must be referred to an established law of the animal economy,

and all attempts to explain it are unavailing. In this particular affection, I know it has been attempted to account for its sympathetic origin, by saying that the cause of irritation may be in the "anticerebral extremities of nerves which are spread out in the liver," &c.; but this explanation is too mechanical, assuming the nerves to be vibratory cords or elastic tubes, conveying impressions by mere continuity of contact. It is better at once to avow our ignorance, and to confess, that, although such sympathetic origin is certain, we have no knowledge of the *mode* in which it takes place.

It is to be remembered, however, that when the brain is primarily affected by any cause of disease, various other parts

also partake of the affection, by the same power of sympathy or reciprocal influence; and in hydrocephalus it is sometimes doubtful in which organ disease primarily arises, or whether the same exciting cause may not operate simultaneously on the different parts affected. If, as I have intimated, the real predisposing cause of hydrocephalus is undue irritability of the cranial brain, the same irritability may exist universally throughout the system, and the abdominal disease and the cranial disease may alike be the immediate effect of the same exciting cause, and the one not be consequent to the other.

When the mucous membrane of the alimentary canal is acted upon by irritating substances, the circulation in the

brain frequently becomes increased, and a disposition to serous effusion is produced. Hence we find in children who are much infested by worms in the intestines, a train of symptoms arise precisely similar to those of the earlier stages of acute hydrocephalus (assuming it to be a distinct disease), which also terminate in effusion into the cavities of the brain, if not averted by the removal of the cause. Neither in the mucous membrane of the intestines, nor in the membranes of the brain, does there exist any inflammation, but only that increased excitement of circulation which must necessarily occasion an augmented flow from the exhalant extremities of the arteries.

Sometimes convulsions or an epileptic

fit will arise in children, in consequence of irritation in the mucous membrane of the intestines: should the child not speedily recover from this, effusion will take place into the ventricles of the brain. It might be said by those who advocate the existence of hydrocephalus as a specific disease, that the symptoms of irritation in the mucous membrane of the intestines were the primary symptoms of hydrocephalus acutus. The effusion, however, in this case, as in others, is an accidental effect, not an essential characteristic, of the affection.

Dr. Whitlock Nicholl says he has seen the erethismal state of the cranial brain kept up, if not induced in the first instance, by the continued exhibition of powerful purgatives. These must cer-

tainly weaken to a great degree, and thus increase the general irritability of the system, and consequently that of the membranous tissues of the brain, upon which the predisposition to this affection so materially depends. This increased irritability of the membranes of the brain, and augmented circulation in its vessels, are said to be greater when the mucous membrane of the stomach and small intestines is affected, than when that of the larger ones is the seat of irritation.*

Such augmented circulation and increased effusion are, however, I believe, rarely produced as a consequence of worms, or other irritations in the in-

* By Dr. Scoulton, of Metz. See *Journal Universel des Sciences Médicales*.

testinal canal, without some febrile affection of the system being first manifested; and in this case it is reasonable to suppose that the disorder of the brain is the consequence of the febrile affection, that organ being affected in a greater proportion than the rest of the system, conformably to what has been already said, when speaking of fever as a cause of hydrocephalus.

When a similar state of irritation subsists in the mucous membrane of the intestinal canal, not kept up by a mechanical cause, it may happen, that the affection shall be at once transferred to the brain by *metastasis*,—an event we frequently find to take place during the progress of many local diseases.

The greater frequency of hydro-

cephalus at present, is ascribed by Dr. Golis (as one cause at least) to the more rare appearance of *achores*, or eruptive diseases on the heads of children. It is contended, that “ The lymphatic system has suffered a powerful revolution, since which, the *achores* have gradually vanished, and the diseases of effusion have become more frequent in children.” What has induced this revolution, it is difficult to determine, or to understand why it should be productive of that inflammatory action of the vessels of the brain, which is said to be the proximate cause of hydrocephalus. That the sudden repulsion of an eruptive disease should occasion increased determination to the brain, and thus produce “ water stroke,” is easy of comprehension ; and

I believe that form of the disease is the usual result of such repulsion.

Dentition is a frequent cause of hydrocephalus, and it produces this effect in either of two ways; *first*, by acting as an exciting cause of fever, during the progress of which, the increased vascular excitement preponderates in an inordinate degree in the cerebral organs; *or*, the local irritation existing in the gums is more immediately communicated to the brain, by that power of sympathy or reciprocal influence which so eminently subsists in the animal system; the consequence of which increased cerebral irritation, is inordinate vascular action and correspondent exhalation. This is more particularly the case in children who are constitutionally predisposed

thereto, in whom effusion sometimes takes place during dentition, without any previous febrile symptoms having manifested themselves.

The predisposition to hydrocephalus is sometimes hereditary, and we not unfrequently find several children of the same family successively falling victims to its attacks. This depends most probably on the original structure of the cerebral organ, and its more than ordinary vascularity rendering it liable to excessive excitement from very slight causes ; so that either during the febrile accessions to which children are commonly subject, and under which they so frequently labour, or from the sympathetic influence produced on the brain from local irritation, effusion takes

place with great facility, and generally with such rapidity as at once to interrupt the functions of the brain, and speedily to destroy life.

General Principles of Treatment.

THE medical treatment of hydrocephalus must be regulated, in no inconsiderable degree, by the view which is taken of its essential characteristic nature, and its immediate proximate cause. Those who believe the train of symptoms denominated hydrocephalus acutus to be a distinct specific disease, arising even in its earliest stages from inflammation, will resort to those depletory methods which are commonly

employed to check inflammation ; whilst others, who consider the effusion as an accidental circumstance, occurring in various diseases of different descriptions, and the symptoms preceding effusion, as those belonging to such diseases respectively, and not constituting a distinct specific disease, having effusion as its natural and essential termination,—will adapt their treatment to these particular diseases.

The little success which has hitherto attended the attempt to prevent this ultimate, and commonly fatal termination, by those who have treated hydrocephalus as a distinct specific disease, may incline us to bestow some attention upon the means naturally suggested by the consideration of the

primary symptoms being those alone of some general or local disease, with which effusion has no natural or necessary connexion.

When the train of symptoms has been preceded by worms in the intestines, or a costive state of those viscera, purgatives will be among the most efficacious remedies we can employ; and we are led to the use of them equally, whether we consider these states merely as circumstances favouring an undue determination of blood to the brain, and thus increasing the circulation through that organ; or whether we consider them as productive of sympathetic irritation in the membranes of the brain, and consequent inflammation. It is accordingly, in incipient hydrocephalus acutus,

arising from or accompanying costiveness and worms, that we are more frequently successful than in other cases of this affection.

It is almost immaterial what particular purgatives we employ, so that we completely empty the intestines of their accumulated contents, and restore the secretions, always in a vitiated state, to a natural and healthy condition. A combination of scammony, jalap, and calomel, will be found highly useful as a purgative for children, directed in such proportions and such doses as are suitable to the age and strength of the individual.

The old-fashioned custom of giving a dose of calomel at night, and senna combined with jalap on the following

morning, is undoubtedly a good one, and is preferable to the modern method of trusting to calomel alone as a purgative, or of promoting its action by a solution of Epsom salts or other saline neutrals; by this latter method, we merely stimulate the excretory ducts to an increased flow, and produce partial action of the muscular fibres of the intestines, but we do not so completely effect the thorough augmentation of the peristaltic motion of the whole canal: by the former method, both of these purposes are effectually answered.

But it is chiefly when costiveness and worms act as causes of fever, and produce this latter affection in the system, that doubt and ambiguity exist the fever thus produced being mistaken for

a specific disease, depending on inflammation of the brain, measures are sometimes employed which, however well adapted for the removal of inflammation, did it actually exist, are most inappropriate to the cure of fever; and we cannot, therefore, wonder at the frequent failure we witness of the treatment of hydrocephalic predisposition.

Fever is a disease which, when once produced, goes on independently of its exciting cause, and has a certain natural progress and determinate duration. It consists of repeated exacerbations and remissions, and is naturally disposed to terminate on certain days, in preference to other days; and in proportion to the regularity of its progress, is the chance of its earlier cessation.

It is commonly terminated by what is called a *crisis*, which is more or less perfect according to the degree of artificial interference; and the danger of relapse corresponds to the more or less perfect state of its crisis. During the progress of the fever, various parts or organs are affected in a disproportionate degree compared with other parts or organs, depending on some peculiar state of such parts, obvious or concealed. Hence arises the necessity of employing measures to relieve the organs thus inordinately affected from threatened danger, although such measures may have no effect in shortening the progress or perfecting the crisis of the fever.

When there exists in a child that predisposition in the brain which has al-

ready been mentioned, fever, once produced affects that organ in an inordinate degree, similarly to what happens in adults, where we find sometimes the brain, sometimes the liver, sometimes other organs, exhibiting the *effects* of the fever; and the symptoms of such local affection, combined with those of the general fever, constitute the state denominated hydrocephalus acutus.

It is under these circumstances, that a diversity of opinion exists as to the relation this general and local affection bear to each other, as cause and effect. While some maintain the local affection to be the original disease, calling it inflammation of the brain, of which the febrile affection are the mere symptoms; it may, on the other hand, be contended

that the local affection *arises* during the progress of the fever, and is a mere effect of the disease, determined in an inordinate degree to the cerebral organ, in consequence of its previous predisposition.

The treatment suggested by these different views must be essentially different. Were inflammation of the brain the sole cause and continued support of the existing symptoms, subduing that inflammation would unquestionably be the most effectual mode of terminating both the local and general affection. On the other hand, were fever the original disease, such attempts would have a tendency to interrupt the natural progress of the disease, and to prolong its duration; consequently, to add to the

danger of effusion, whilst the force of the fever continued to be directed inordinately to the brain, in consequence of its state of predisposition.

The proper treatment of every description of fever seems to consist in this; *first*, to promote, by every means in our power, a complete intermission of the periods; and *secondly*, to diminish the force and shorten the duration of the exacerbations, thereby hastening the natural crisis, and rendering it at the same time more perfect and effectual. While we attempt this important object, we are also to direct our attention to relieving any particular organ which may be attacked by the fever in a disproportionate degree, and thus obviate the danger of organic mischief.

Dr. Cheyne, notwithstanding his hypothesis of the nature and proximate cause of hydrocephalus, bears witness to the utility of remedies calculated to effect the intentions above mentioned; and he thereby undoubtedly confirms the view I have taken of hydrocephalus being a concomitant or sequence of proper fever. He says that *antimonials* in combination with cathartics have appeared to him very useful in the infantile remittent, and other cases *liable to degenerate* into hydrocephalus. This implies hydrocephalus not to be a distinct specific disease *ab origine*, but a termination of other acknowledged diseases, or an accidental circumstance arising during their course.

It is not my intention to describe the

method of treating proper fever, or to detail the means necessary to be pursued in order to subdue inflammation; these, it is presumed, are already sufficiently known to those who may be called upon to treat diseases in general; but shall content myself with repeating, that I consider the ordinary train of symptoms denominated hydrocephalus acutus, as a state of proper fever, operating with preponderating force on the cerebral organ; the affection of which, in its turn, modifies in some degree the course of the fever; and shall offer an observation or two on the efficacy of blood-letting, as usually employed in the treatment of such cases.

In proportion to the irritability of any part, is the increased determination of

blood to that part, and the frequency of circulation through it, and these states act reciprocally upon each other. Whatever, therefore, has a tendency to diminish the determination of blood to the cerebral organ, or to allay its excessive vascular action, must be highly beneficial in cases of threatened attacks of hydrocephalus. But it is extremely improper to attempt effecting this intention by means which, at the same time, manifestly increase the already too great irritability of the organ, as, by so doing, we counteract our own efforts. It is upon this ground I strongly object to general blood-letting in children, because this evacuation produces immediate weakness and consequent increase of irritability; and although we may for

a short time diminish the actual quantity of blood sent to the head, we do not alter the condition of the vascular system, which gives rise to the predisposition to hydrocephalus, and upon this depends the safety or danger of the patient. On the contrary, by increasing the irritability of the brain, increased effusion is afterwards produced with great facility.*

* Mr. Cooke, who has inserted some observations on hydrocephalus in the Medical Repository, Vol. XI., and who appears to speak from experience, says, "Whenever bleeding had been carried to a large extent, although it temporarily improved the patient's condition, unfolded reason, or removed some degree of coma, yet a proportionately larger quantity of fluid was effused." This accords also with the result of Dr. Seeds' experiments on blood-letting, who, on bleeding healthy animals to death,

The determination of blood to the head, and increased frequency of circulation through the brain, are sometimes mistaken for *congestion* in that organ, and, in conformity with this idea, blood-letting is unnecessarily had recourse to. But a state of congestion differs materially from the actual condition of the cerebral vascular system in cases of this affection, as does also a state of inflammation; and the means which would be efficacious under either of those states, will be prejudicial in hydrocephalus; and we accordingly

and afterwards opening the head, found “ a *very large quantity* of water effused into the ventricles.”*

* Med. Chir. Journal, Vol. I.

commonly find ourselves baffled, when we attempt to cure this affection by those general depletory methods which are so eminently serviceable in cases of actual inflammation.

An accumulation of fluid in serous cavities may take place, either from increased action of the exhalants opening into those cavities, or from diminished action of the absorbents arising therefrom;* it is therefore evident that the

* Chronic hydrocephalus appears generally to arise from this cause; for no febrile symptoms precede the effusion, which would be the case were inflammation the immediate cause of that event; and when the accumulated fluid has been evacuated, it is speedily reproduced, without any symptoms being manifested indicating an inflammatory state of the cerebral organ. I have seen three pints of

treatment required in the two cases must be different.

When the activity of the circulation is very great in the membranes of the ventricles, it may be expedient to diminish it by depletory means, a mode of practice which might be highly prejudicial when the lymphatic or absorbent system alone was in fault. Accordingly we have the testimony of Dr. Golis, that in cases of this affection which follow general glandular disease, the repulsion of febrile or chronic eruptions of the skin, or suddenly suppressed chronic discharges from ulcers, blood-letting is not so efficacious as in other

fluid evacuated by puncture from a child's head, and a reproduction of the like quantity take place within four days.

forms of the disease, and, as he says, if carried to a considerable extent may rapidly lead to death.

When the disease in children of more advanced age follows too intense and continued study, blood-letting is also said by Dr. Golis to be prejudicial, and if considerable, may rapidly lead to death. There can be little doubt, that, in the cases of disease thus produced, the activity of the circulation in the membranes of the ventricles must be increased, and a state of vascular action induced, which is considered by many pathologists, and by Dr. Golis himself, as inflammation. Here experience seems to be at variance with theory, since the most efficacious method of subduing inflammation, the proximate cause of the

disease, according to these pathologists, is either to be totally avoided or to be cautiously practised. To those who attribute the predisposition to effusion in children, to the increased irritability of the brain, induced by its too intense excitement, such caution is sufficiently intelligible, as blood-letting and other depleting measures are powerful means of increasing this state of irritability.

This objection does not apply with so much force to local abstraction of blood by means of leeches, when there exist evident signs of increased determination to the brain. A moderate loss of blood in this way, at the same time that it protects the organ itself from the threatened danger, increases also the chances of a critical termination of the

fever; for as all local affections arising in the course of a fever have a tendency to interrupt its natural progress, and prolong its duration; so, whatever moderates the degree of local affection must act beneficially on the general disease, if it be not carried to a prejudicial extent. Although, therefore, I should not trust to this application for the cure of the malady, I should employ it as an auxiliary with the view above mentioned.

No class of medicines appears to be better adapted to the combined state of fever and irritability, than sedatives and diuretics; and considerable benefit has been derived from employing them in hydrocephalus. The mineral acids, united with squill or with digitalis,

exert a beneficial effect both in diminishing the force of the exacerbation and controlling inordinate vascular action, both general and local.

The action produced by these medicines upon the kidneys, may, perhaps, also have a salutary effect in arresting effusion into the ventricles, or removing whatever fluid has been already deposited. In cases wherein the secretion of urine has been suspended in consequence of some affection of the kidneys, we find an affection of the brain speedily to arise, and, on dissection, fluid is discovered to be deposited in the cavities of the brain. This would lead us to suspect, that the action of the exhalants in the brain, and that of the vessels in the kidneys, were in some measure

vicarious to each other.* In a case of chronic hydrocephalus lately under my care, the most decided benefit seemed to be derived from the continued exhibition of these remedies; the bowels being at the same time (though with great difficulty) kept freely open by purgatives of jalap and scammony.

But it is chiefly in counteracting the predisposition to this affection, that we can hope to be eminently successful.

The means of effecting this must be sought for in those medicines which diminish irritability in the system generally, and moderate the inordinate circulation in the vessels of the brain. As

* See, in illustration, a case of paralysis of the kidneys, by Sir Henry Hallford, in the Transactions of the College of Physicians, vol. vi. p. 410.

general irritability is found to exist in an eminent degree in children of a weakly habit, medicines which produce a tonic effect are frequently of very great service in counteracting the predisposition to this complaint. At the same time, it is requisite to administer such as do not exert much stimulant power, when with debility is conjoined increased action of the vascular system.

When simple debility exists alone, produced either by too long continuance at the breast, or by the use of improper diet, some of the preparations of iron may be used with much benefit. Among these, the tartrate of iron is one of the most commodious, for being soluble in watery fluids it can be given with great facility. The *liquor ferri alkalini* of

the London Pharmacopœia, is also a useful form.

When increased vascular action is present in children of weakly habits, especially if there are signs of rapid circulation in the cerebral organ, the metallic tonics are not so well adapted as in cases of debility alone. But here the mineral acids will prove eminently serviceable, exerting both a tonic and sedative effect, allaying inordinate action, and diminishing excessive irritability.

When the predisposition to hydrocephalus is hereditary, greater attention will be requisite to avoid all those causes which, by exciting undue vascular action in the brain, favour the increase of effusion from the exhalant extremi-

ties of the arteries. Here, also, the tonic effects of the acids, liberally exhibited, will be found highly beneficial, as will likewise the other modes of strengthening the general system ; whilst care must be taken not to exercise the intellectual faculties beyond a just moderation.

In all of these cases, the diet is to be nourishing and invigorating, such as is easily digestible, and affording abundant chyle and blood. In proportion to the fulness of the blood-vessels in children, is their degree of robust health, and their freedom from that irritability of habit which predisposes to disease. Plethora can scarcely be said to exist in very young children ; for, whatever be the supply of blood, nature is engaged

in such continual processes of expenditure in perfecting the growth of the individual, as to relieve the system from what otherwise might be a superabundance of blood. When the growth is perfected, it is, of course, necessary to guard against the effects of plethora; but this is a circumstance which does not come within the scope of the present observations.

It is to be taken as a general rule, that in children more mischief arises from irregularity of diet, and using improper substances for food, than from the mere quantity of that which is easily digestible, so that what is taken at any one time does not overload the stomach and impede its appropriate functions.

No general directions can be given

as to the quantity of food proper for each individual; appetite is the best guide, provided it has not been vitiated by using improper articles of food. More mischief than parents are aware of, arises from this single source, the consequence commonly of mistaken indulgence.

These observations apply chiefly to weakly children, for when there is naturally an innate strength of constitution, many irregularities of diet and management are rendered harmless by the salutary operations of the *vis medicatrix*, the resources of which power in the animal system are wonderfully abundant.

To enter into a particular consideration of the various minutiae embraced

under these two general heads, is foreign to the purpose of the present little tract; they would of themselves constitute a volume of no inconsiderable size, and the subject has frequently been specifically handled, and with great ability, by different authors, whose works are before the public. My object is to direct the attention of practitioners to the view I have taken of acute hydrocephalus; that of not considering it as a proper idiopathic disease, but the effect of some previously existing disease, the most frequent of which is fever; or, as the consequence of increased exhalation, the natural result of simple increased vascular excitement, arising from various causes, acting in children of debilitated constitutions, or irritable habits; and to

point out the obvious inutility of combating a single symptom, in place of embracing a comprehensive view of the essential character, usual progress, and natural termination of the preceding or existing disease.

THE END.

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